UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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April 30, 2015

Mr. Charles P. Nicholson
NEPA Manager
Tennessee Valley Authority
400 West Summit Hill Drive WT 11D
Knoxville, TN 37902

Subject: EPA NEPA Review Comments on TVA's Integrated Resource Plan – 2015 Draft Supplemental Environmental Impact Statement; CEQ No. 20150060; ERP No. TVA-E09815-KY

Dear Mr. Nicholson:

The U.S. Environmental Protection Agency (EPA) has reviewed the subject Tennessee Valley Authority (TVA) 2015 Draft Supplemental Environmental Impact Statement (DSEIS) in accordance with our responsibilities under Section 102(2)(C) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. The Integrated Resource Plan (IRP) provides options (future condition scenarios, alternative planning strategies, and resource planning portfolios) for TVA's future generation of electricity to sustainably supply the Tennessee Valley's projected customer needs for the next 20 years.

The TVA proposes to update its 2011 IRP to determine how it will meet the electrical needs of its customers over the next 20 years, and fulfill its mission of low-cost, reliable power, environmental stewardship and economic development. We commend TVA for its overall development of a comprehensive energy plan and EIS and, specifically, for strategic planning that de-emphasizes conventional coal and pursues lower emission power generation strategies. We also appreciate TVA's introduction of the IRP and DSEIS to us in a presentation at our EPA office in Atlanta on March 25, 2015.

Accompanying the DSEIS was a separate Draft IRP document. While we have concentrated on the NEPA review and comment of the DSEIS, we have also provided some review comments on the Draft IRP as well. Our comments are provided for TVA's consideration during its development of the Final Supplemental Environmental Impact Statement (FSEIS) and the Final IRP.

Overview

TVA completed an IRP and associated EIS in 2011. Several changes in the power industry, both regionally and nationally, have led TVA to develop this new IRP and associated DSEIS. When completed, the new IRP will update and replace the 2011 IRP. The purpose of the IRP and EIS processes is to evaluate TVA's current energy resource portfolio and alternative future portfolios of energy resource options at a least system-wide cost to meet the future electrical energy needs of the TVA region while taking into account TVA's overall mission of energy, environmental stewardship and economic development. Energy resource options include the means by which TVA generates or purchases electricity, transmits that electricity to customers and influences the end use of that electricity through energy efficiency and demand response programs. As part of the IRP and EIS processes, TVA evaluated the future demand for electricity by its customers, characterized potential supply- and demand-side options for meeting future demand and assembled these options into planning strategies and capacity expansion plans or portfolios.

EPA Expectations

Relative to TVA's future electricity generation, EPA's main concerns center on air quality, water quality/quantity, social economic and climate change effects. From our perspective, EPA would support an emphasis on demand-side reductions (increased technological efficiency and conservation incentives) to reduce the need for power; increased development of renewable ("green") power using diverse traditional and emerging generators[1]; additional nuclear capacity using state-of-the-art reactor technologies; increased use of natural gas and clean coal fossil fuel technologies[2]; decommissioning ("layups") and repowering of traditional coal power plants; reduced water consumption technologies and increased waste heat reuse designs; and power purchases (as needed) from sources which minimize environmental impacts while TVA's own capacities from such sources is maximized. These generation strategies could increase customer efficiency/conservation and green power capacity, reduce the volume of air emissions including GHGs such as CO_2 (in terms of CO_2 equivalents: CO_2e) and reuse or sequester generated CO_2; continue to make use of domestic natural gas resources as well as domestic coal resources through clean coal technologies; minimize water consumption required for cooling water and the volume of thermal effluent discharge; minimize the need to transmit electricity and transport feedstocks through strategically locating generators close to users where possible; and other benefits associated with power industry advances that can be expected over the next 20 years.

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[1] For examples, efficient hydropower generation and development of wind and solar (conventional photovoltaic and solar concentration technologies) and possibly current/wave energy, where appropriate. EPA recognizes that availability of such resources, especially wind and solar, is uneven due to the Tennessee Valley's meteorology and topography.

[2] For examples, Combined Cycle (CC) and Combined Turbine (CT) technologies for natural gas and Integrated Gasification Combined Cycle (IGCC) technology for clean coal.

EPA Recommendations

Our recommendations for the Draft IRP and DSEIS consist of comments and recommendations specific to various media areas are located in the attached detailed comments. Also, we recommend that TVA consider evaluating the environmental compliance of suppliers that they use. For example, does TVA evaluate the water use, CO2 emissions and environmental compliance of the generators of natural gas, for instance, and include those values into their environmental analysis. As the largest producer of public power in the United States, TVA has the opportunity of significantly influencing the expectations of environmental compliance by their suppliers by including an evaluation of those environmental metrics and considerations in TVA's final plan. The environmental metrics of the suppliers could also influence the direction of energy production for TVA in the future.

EPA DSEIS Rating

EPA commends TVA for its overall development of a comprehensive energy plan and DSEIS that de-emphasizes conventional coal and pursues lower emission power generation strategies over the 20-year planning period. However, TVA has not yet identified (Chapter 1, pg. 6) an alternative planning strategy in the DSEIS, and TVA's power generation approach for the next planning period remains unclear. EPA therefore rates this DSEIS as an "EC-2" (Environmental Concerns, with additional information requested) and recommends that strong consideration be given to an alternative similar to planning strategy E *(Maximize Renewables)*, modified to give greater emphasis on diversity in power generation, renewables, customer efficiency/conservation, and use of cleaner technology for carbon-based resources. Regarding our request for additional information, we recommend clarification of the subject areas described in the enclosed *Detailed Comments*.

EPA appreciates the opportunity to review this DSEIS. If you have questions on our comments, please contact Larry Gissentanna of my staff at 404/562-8248 or gissentanna.larry@epa.gov.

Sincerely,

Heinz J. Mueller, Chief
NEPA Program Office
Resource Conservation Restoration Division

Enclosure: *Detailed Comments*

DETAILED COMMENTS
(4/30/15 EPA LETTER)

Air Quality

1. Ozone - Page 76: We recommend clarifying the first full paragraph on page 76 to reflect the current status of the 2008 ozone non-attainment areas in Tennessee and the revised ozone standards proposed in November 2014, as shown below.

- "In 2008, EPA lowered the eight-hour ozone standard from 80 ppb to 75 ppb; Knoxville and Memphis are currently designated as non-attainment areas for this standard, however, both areas are attaining the 2008 ozone standard of 75 ppb. Tennessee has submitted to EPA a final redesignation request for Knoxville which EPA is processing. In November 2014, EPA proposed revised primary and secondary ozone standards of between 65 and 70 ppb (EPA is also taking public comment on taking the primary standard down to 60 ppb); these standards will be finalized by October 1, 2015. If these standards stay as proposed, and depending on future ozone ambient air monitoring levels, there is a possibility that additional areas in the TVA region could be designated non-attainment for ozone standards."

2. Particulate Matter - Pages 77-78: We recommend clarifying the section on particulate matter located on pages 77-78 as shown below.

- "Particulate matter is regulated by size class: particulate matter less than 10 micrometers in diameter (PM10) and particulate matter less than 2.5 micrometers in diameter (PM2.5). Particulate matter regulations have evolved over the past 40 years to become more stringent and to place more importance on fine particles. The first National Ambient Air Quality Standards (NAAQS) for particulate matter was established in 1971 and was based on total suspended particulates (TSP). In 1987 the PM10 NAAQS was added, and in 1997 the PM2.5 NAAQS was added and the TSP NAAQS was dropped. In 2006 the 24-hour average PM2.5 NAAQS was lowered from 65 to 35 μg/m3, and in 2012 the annual average PM2.5 NAAQS was lowered from 15 to 12 μg/m3.

There are no non-attainment areas for PM10 in the TVA region. There are two PM2.5 non-attainment areas in the region based on the previous annual NAAQS of 15 μg/m3, which include counties in the vicinity of Chattanooga and Knoxville. The counties in the vicinity of Knoxville are also non-attainment for the 24-hour PM2.5 NAAQS of 35 μg/m3. Non-attainment areas for the 2012 PM2.5 annual NAAQS (12 μg/m3) were designated on December 18, 2014, and do not include any areas in the TVA region. However, final designation decisions have been deferred for up to one year for the entire State of Tennessee except for three counties in the Chattanooga area.

Ambient particulate matter levels have decreased in recent decades. Since 1986, 24-hour PM10 levels have decreased 57 percent (Figure 4-17) to a 2013 regional average level that is 26 percent of the NAAQS. Between 1999 and 2013, annual average PM2.5 levels decreased by 46 percent and 24-hour PM2.5 levels decreased by 50 percent (Figure 4-

18). In 2013, regional average annual PM2.5 levels were 78 percent of the new lower annual NAAQS, and regional average 24-hour PM2.5 levels were 55 percent of the 24-hour NAAQS. Particulate matter levels are influenced by weather patterns that may cause fluctuations from year to year, but the trend of declining particulate matter levels is still apparent."

- Page 78: Please update, as shown, the 1979 date to "1986" in the title of Figure 4-17 to reflect the text and the years displayed in the figure: "Figure 4-17 Regional average PM10 concentrations, 1986–2013. Source: EPA AQS Database."

- Page 78: Please update, as shown, the 1979 date to "1999" in the title of Figure 4-18 to reflect the text and the years displayed in the figure: "Figure 4-18 Regional average PM2.5 concentrations, 1999–2013. Source: EPA AQS Database."

3. Sulfur Dioxide:

- Figure 4-10– Page 72: Consider revising the legend for the Figure 4-10 pie chart on page 72 to reflect that the "65.4%" represents sulfur dioxide emissions which TVA emitted in 2012. If TVA has more current emissions data (i.e., 2013-2014), we suggest to include this in any updated version of the document.

- Page 73: Consider discussing in the text the sulfur dioxide emissions data trends for the 1-hour, 24-hour and annual sulfur dioxide NAAQS shown in Figure 4-12 on page 73.

- Pages 72-73: In areas not designated for the 1-hour sulfur dioxide NAAQS, the 24-hour and annual sulfur dioxide NAAQS are still applicable. We recommend including the following clarifications to the section on sulfur dioxide located on pages 72-73 as shown below.

"Air quality standards for SO2: In June 2010 EPA established a new one-hour average primary SO2 health-based standard at 75 parts per billion, retained the three-hour secondary standard and revoked the 1971, 24-hour and annual standards. The average three-hour concentrations of SO2 in the TVA region have been reduced by 87 percent from 1979 to 2013 and concentrations are well below the NAAQS standard (Figure 4-12). In 2013, average three-hour SO2 concentrations were just 7 percent of the standard, and there were no exceedances of the three-hour SO2 standard in the TVA region. In August 2013 EPA designated 29 areas in 16 states non-attainment for the 2010 1-hour SO2 standard based on available air quality monitoring data (including part of Sullivan County in northeast Tennessee) and deferred designations for the rest of the country. For those 29 areas designated in 2013, the 24-hour and annual standards were revoked one year after the effective date of the designations. For those remaining areas in the country that have not been designated for the one-hour SO2 standard, the 1971, 24-hour and annual standards remain in effect until one year after the effective date of designations for these areas. EPA plans to designate the rest of the country based on air quality data from additional installed SO2 monitors or the use of dispersion modeling. A March 2, 2015,

court ordered consent decree requires EPA to complete designations for the rest of the country for the 1-hour SO2 NAAQS in three additional rounds: the first round by July 2, 2016, the second round by December 31, 2017, and the final round by December 31, 2020."

Historic Preservation

- p. 119 - The DSEIS summarizes the project team's evaluation of historic architectural resources in the TVA region, and coordination with the State Historic Preservation Officers (SHPOs). Page 119 states that Browns Ferry Nuclear Plant and Shawnee Fossil Plant are eligible for listing in the NRHP, but that TVA has not consulted with the SHPOs on their eligibility. The DSEIS does not state whether Tribal Historic Preservation Officers (THPOs) have been contacted, or whether their involvement is applicable in this project.

Recommendations: The FSEIS should clarify why the TVA has not consulted with the SHPOs on the eligibility of the Browns Ferry Nuclear Plant and the Shawnee Fossil Plant. The FSEIS should also clarify whether THPOs have been contacted, and include an update of coordination activities with the SHPOs (and THPOs, if applicable), along with finalized decision documents pursuant to Section 106 of the NHPA, if available. The EPA defers to the SHPOs and THPOs on these issues.

Nuclear Waste Storage

- p. 122 - Storage, transportation and disposition of spent nuclear fuel is an issue of particular concern for all nuclear power plants. Page 122 discusses high-level waste storage, and states that storage capacity at Sequoyah and Browns Ferry spent fuel pools has been exceeded, and that dry cask storage has begun at these facilities. The capacity for continued storage at these locations is unclear; page 211 discusses expansion of storage facilities. The need for on-site storage could potentially continue for decades.

Recommendation: The FSEIS should reference the Continued Storage Rule (formerly Waste Confidence), and clarify potential direct, indirect and cumulative impacts that may occur as a result of the continued on-site storage.

Climate Change

CEQ Draft Guidance on GHG Analysis within NEPA. We believe the Council on Environmental Quality's December 2014 revised draft guidance for Federal agencies' consideration of GHG emissions and climate change impacts in NEPA outlines a reasonable approach, and we commend TVA for using that draft guidance to help outline the framework for its analysis of these issues.

Water Quality

The EPA commends TVA for considering environmental impacts in their efforts to reduce energy consumption. Such considerations not only allow for the selection of a strategy that will support the supply and demand of energy consumption, but should also protect the quality of the Region's surface waters and aquatic and biological life. Section 4.6, Water Quality, of the Draft SEIS IRP (pages 93-98) discusses these considerations as it presents both the causes of degradation and current ecological health for the waterbodies associated with energy production. Although mentioned in Section 4.5, Groundwater, Section 4.6 does not mention Coal Combustion Residuals (CCR) as being a potential cause of degraded water quality through seeps or direct hydrologic connection to surface waters. Although a detailed overview of the most common water quality impacts is provided no discussions regarding the statutory requirements and how they are applied to the protection and maintenance of surface water quality are presented. By referencing the statutory requirements, the conclusions gathered from the study would be strengthened. Examples of such discussion include referencing the (1) Antidegradation Statement, which is found at Rule 0400-40-03-.06 of the General Water Quality Criteria, which presents the requirements for authorizing regulated activities such as water withdrawals; and (2) statutory water quality criteria for commonly associated pollutants as done in Section 4.3, Air Quality, of the DSEIS

It is suggested that the EIS be revised to (1) reference the statutory requirements, which are found at http://www.tn.gov/sos/rules/0400/0400-40/0400-40-03.20131216.pdf (2) present specific narrative and numeric criteria that will support in the protection and maintenance of water quality and the designated use (i.e. mercury, DO, temperature, habitat, biological integrity, etc.) in tabular form as done with the Air Quality Section of the DSEIS; and (3) summarize or reference the Antidegradation Statement where specific conditions for water withdrawals are provided. In considering the suggested revisions, acknowledgement of the federal and statutory requirements would be made and would result in a more thorough EIS.

The IRP indicates that TVA operates 109 conventional hydroelectric generating units at 29 dams and has a long-term power purchase agreement with the US Army Corps of Engineers for eight dams on the Cumberland River making a total of 37 dams. The IRP discusses some of the impacts of dams on water quality (pg. 95) focusing on the effects on low DO and periods of little or no flow. Nationally, the state-of-the-science for understanding the significant impacts to water quality from hydrologic alteration such as dams has grown considerably along with the understanding of ways to work to improve those significant water quality impacts. The IRP notes that as early as the 1990s, the TVA invested in improvements at 16 of their 37 dams to improve DO levels and maintain minimum flows in tail waters. The TVA's work on improving operation of dams to improve water quality is commendable and should be acknowledged for its early attention to the importance of evaluating flows below dams. The EPA notes the reference to the Reservoir Operations Study Final Programmatic Environmental Impact Statement (2004) and the ongoing efforts there including over $60 million spent to evaluate and improve flows below dams – a record of which TVA should be proud. The EPA would

welcome working with the TVA to better understand and where possible, share with other dam operators those improvements that the TVA has already put into place that have resulted in improved water quality.

With that in mind, as hydropower will remain a core component of future energy production, the TVA is encouraged to more fully incorporate and consider the ongoing work to improve water quality below dams in the text/metrics of the IRP. The EPA notes TVA's acknowledgement of impacts of dams on surface waters in Chapter 4 - Affected Environment, however, there are three areas where they could be more fully incorporated/expanded to more fully address these impacts:

- Section 4.6 Water Quality. The subheading "Causes of Degraded Water Quality" includes wastewater discharges, runoff discharges, cooling systems and air pollution. The EPA recommends that a fifth bullet be included titled hydrologic alteration/dams, which is not included under any of the other topics.

- The section entitled Low Dissolved Oxygen Levels and Low Flow Downstream of Dams should be retitled to more fully capture all of the impacts of dams which may include the inability to meet narrative or numeric water quality standards, including DO, temperature, metals, nutrients, etc. and/or impact the designated use for all aspects of flow alteration beyond just the impacts or effects of low flows. For example, this could be called, "Water Quality Impacts Downstream of Dams:"

- The impacts on water quality from dams should be included as one of IRP's Environmental Metrics (Appendix F), which currently includes just CO2 average tons emitted, water consumption and waste. Although the TVA may not have included this because it has a program in place to begin to address these water quality impacts, the EPA believes that leaving off the metric gives the impression that there is no impact from dams or that it is not a metric being taken into consideration for future operations, including the hydropower operations which will continue to operate well into the future.

Once a metric for water quality is put in place, the TVA could more directly address its plans to look at the water quality impact from its dams. As TVA is aware, enormous advances have been made in the study of the impacts of dams as well as on dam re-regulation that could inform TVAs operations in the future. EPA acknowledges that the ability to modify operations varies based on the type and purpose of the dam (i.e. hydropower, flood control, irrigation, etc), as well as all of the other downstream uses of rivers, however, virtually all dams, regardless of size, have the potential to be modified to improve flows[3] . The TVA is noted for conducting its own research and is certain to be staying abreast of the large-scale flow experiments that have been documented world-wide and may be able to continue its improvements to dam operations throughout the system based on those new studies and experiments.

[3] Arthington, A. 2012. Environmental Flows: Saving Rivers in the Third Millennium. University of California Press.

The EPA requests that the TVA include in the IRP any efforts where it plans to expand restoration beyond the 16 dams already modified or provide additional improvements at the initial 16 dams. These alterations to dam operations should consider changes beyond just the protection of minimum flows; for instance, to fully consider the magnitude, frequency and duration of high flow events, reactivation of flood plain storage and other documented approaches to improving water quality to support all narrative and numeric criteria and designated use support below dams. The TVA's work in this area, and its future commitment to improving flows below all of its dams, should be included directly as part of the environmental metrics sections. It should be considered as an integral part of all future planning for power generation both to more accurately cover environmental metrics as well as to highlight the TVA's knowledge and experience in this area.

Environmental Justice

Based on our review, there is no discussion on environmental justice and socioeconomics related to either the existing and /or proposed assets and needs by resource category (i.e., coal, nuclear, hydropower, etc). The Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (February, 1994) directs Federal Agencies to make achieving environmental justice part of its mission by identify and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low income populations," including tribes. The Executive Order 12898 / Presidential Memorandum, discusses the importance of using the NEPA review process to promote environmental justice. EPA notes that strategies discussed pursuant to the IRP and the DSEIS may have implication on low-income and /or minority populations. Therefore, it would be helpful to discuss whether the actions proposed affect these populations and if so, how.

- The draft plan includes a discussion on the public involvement process and general comments, but it is unclear whether any community concerns related to environmental justice issues were raised and whether EJ populations were meaningfully engaged in the process. The Final IRP should include this information, if possible.

- It would be helpful to include maps identifying the locations of the existing and proposed assets (nuclear, coal, etc.) along with demographics and socioeconomics information associated with the facilities or projects, where feasible.

General Comments

- p. 45 – Description of construction activities for new natural gas fueled CC plants is provided in this section of Chapter 3. Any NEPA documents (EA or EISs) completed to support these TVA actions should be cited.

- EPA supports the Renewable Power Purchase programs implemented by TVA.

- EPA supports the Residential/Business/Industry Energy Efficiency Programs implemented by TVA.

- p. 53 – In reference to the TVA Green Power Providers Program it is stated that "For calendar year 2015, the Green Power Providers program capacity for new applicants is capped at 11.33 Megawatts (MW)," TVA should provide additional clarification in the FSEIS on why this program is "capped" at 11.33 MW.

- p. 55 – Additional discussion should be provided on why coal-retirement related transmission system upgrades are needed. Significant capital investments are mentioned for these upgrades.

- p. 94-95 – Under discussion of Affected Environment – Water Quality Section the scope of the discussion is limited to power generation (NPDES discharges from plants, nuclear waste management, cooling systems, etc.). It is unclear why extraction of fuel sources is not considered in this section since it is a related action. Resource extraction often can impact water quality more significantly than the power plant operation. These indirect impacts should be considered and identified in the FSEIS.

- p. 173-175 – Facility land requirements are discussed in this section and facility specific information is provided in subsequent sections. EPA understands TVA is defining facility land requirement as "the total acreage permanently disturbed by the construction of new generating facilities under each of the alternative strategies and portfolios." EPA believes this to be a useful tool in evaluating/comparing new generating facilities, however, additional consideration should be given to how the land is impacted. For example, the long-term impact of a coal-fired power plant (onsite ash disposal, decommissioning of site, etc.) can have a much more significant long-term environmental impact on land than a wind or solar farm site would. These longer-term impacts should be considered when discussing facility land requirements.

- Figure 7-3 – editorial comment - Alt C is repeated twice. The second Alt C is most likely Alt. E.